

CLAIMS

1. A method for screening for the effect of a test agent on a population of fly larvae comprising

providing a population of fly larvae;

administering at least one test agent to said population;

creating a digital image showing at least one trait of specimens in the population; and

correlating the traits of the population with the effect of the test agent(s) administered to the population.

2. A method for screening for the effects of a test agent on a population of fly larvae comprising

providing a plurality of populations of fly larvae;

administering at least one test agent to each of said populations;

creating a digital image showing at least two traits of specimens in each population;

for each population, correlating the traits of the population with the effect of the test agent(s) administered to the population.

3. The method of claim 1 further comprising the step of determining at least one trait of said population.

4. The method of claim 2 further comprising the step of determining at least two traits of each population.

5. The method of claim 1 or 2 wherein said trait is selected from the group consisting of total distance traveled over a defined period of time, distance traveled in X direction over a defined period of time; distance traveled in Y direction over a defined period of time; total distance moved per time unit; distance moved in X direction per time unit; distance moved in Y

direction per time unit); the rate of change of velocity per time unit, turning, stumbling, spatial position, and path shape.

6. The method of claim 1 or 2 wherein said step of determining comprises measuring data selected from the group consisting of X-pos, X-speed, speed, turning, stumbling, size, T-count, P-count, T-length, Cross150, Cross250, and F-count.

7. The method of claim 1 or 2 wherein said trait is selected from the group consisting of movement of one fly larva toward or away from another fly larva, occurrence of no relative spatial displacement of two fly larvae, occurrence of two fly larvae within a defined distance from each other, and occurrence of two fly larvae more than a defined distance away from each other.

8. The method of claim 1 or 2, wherein said trait is a morphological trait.

9. A method for ranking test agents comprising

providing a plurality of populations of fly larvae;

contacting each of the populations with a different test agent;

determining at least one trait for each of said population to produce an agent phenoprofile; and

ranking said test agents according to the similarity or difference of each agent phenoprofile with a reference phenoprofile defined by said at least one trait as measured in a reference population of fly larvae.

10. A method of screening for an agent with a desired biological activity comprising:

providing a plurality of populations of fly larvae;

contacting each of said populations with a different test agent;

determining an agent phenoprofile for each of said populations, wherein the agent phenoprofile comprises a quantitative description of one or more traits exhibited by fly larvae in the population;

comparing the agent phenoprofile to a reference phenoprofile, wherein the reference phenoprofile comprises a quantitative description of said one or more traits exhibited by fly larvae in a reference population; and

selecting said agent based on the comparison of the agent phenoprofile and the reference phenoprofile corresponding to each agent.

11. The method of claim 9 or 10 wherein said trait is selected from the group consisting of total distance traveled over a defined period of time, distance traveled in X direction over a defined period of time; distance traveled in Y direction over a defined period of time; total distance moved per time unit; distance moved in X direction per time unit; distance moved in Y direction per time unit); the rate of change of velocity per time unit, turning, stumbling, spatial position, and path shape.

12. The method of claim 9 or 10 wherein said step of determining comprises measuring data selected from the group consisting of X-pos, X-speed, speed, turning, stumbling, size, T-count, P-count, T-length, Cross150, Cross250, and F-count.

13. The method of claim 9 or 10 wherein said trait is selected from the group consisting of movement of one fly larva toward or away from another fly larva, occurrence of no relative spatial displacement of two fly larvae, occurrence of two fly larvae within a defined distance from each other, and occurrence of two fly larvae more than a defined distance away from each other.

14. The method of claim 9 or 10 wherein said trait is a morphological trait.

15. A method of screening for an agent with a desired biological activity comprising:

providing a population of fly larvae;

contacting said population with a test agent;

determining an agent phenoprofile for said population, wherein the agent phenoprofile comprises a quantitative description of one or more traits exhibited by fly larvae in said population;

comparing the agent phenoprofile to a reference phenoprofile, wherein the reference phenoprofile comprises a quantitative description of said one or more traits exhibited by fly larvae in a reference population; and

selecting said agent based on the comparison of the agent phenoprofile and the reference phenoprofile corresponding to said agent.

16. The method of claim 15 wherein said trait is selected from the group consisting of total distance traveled over a defined period of time, distance traveled in X direction over a defined period of time; distance traveled in Y direction over a defined period of time; total distance moved per time unit; distance moved in X direction per time unit; distance moved in Y direction per time unit); the rate of change of velocity per time unit, turning, stumbling, spatial position, and path shape.

17. The method of claim 15 wherein said step of determining comprises measuring data selected from the group consisting of X-pos, X-speed, speed, turning, stumbling, size, T-count, P-count, T-length, Cross150, Cross250, and F-count.

18. The method of claim 15 wherein said trait is selected from the group consisting of movement of one fly larva toward or away from another fly larva, occurrence of no relative spatial displacement of two fly larvae, occurrence of two fly larvae within a defined distance from each other, and occurrence of two fly larvae more than a defined distance away from each other.

19. The method of claim 15, wherein said trait is a morphological trait.

20. A method for determining parameters useful for a phenoprint comprising:

measuring a plurality of traits in a first population of fly larvae, said first population having a first phenoprofile;

measuring said traits in a second population of fly larvae, said second population having a second phenoprofile;

comparing the traits of the first population and the second population; and

identifying one or more traits that are different in said first and second populations, said one or more different traits defining the phenoprint.

21. The method of claim 1 or 9, wherein said step of determining comprises determining more than one trait.

22. The method of claim 21, wherein said at least two traits define a phenoprint.

23. A method for determining whether a test agent modifies, delays or prevents onset of a phenotype in a transgenic fly larva comprising:

providing a population of transgenic fly larvae, wherein the population develops a phenotype due to expression of a transgene;

contacting said population with a test agent;

for the population contacted with the test agent, determining an agent phenoprofile for the population at a plurality of times during the life of the fly larva;

comparing the agent phenoprofile generated at each of the plurality of times to a reference phenoprofile generated at each of the plurality of times for a reference population, wherein the reference population consists of fly larvae not contacted with said test agent; and

determining whether said test agent modifies, delays or prevents onset of a trait in said population contacted with a test agent compared to said reference population.

24. A method of preparing a medicament for use in treatment of a disease in mammals comprising

providing a population of fly larvae with a phenotype with characteristics of a mammalian disease;

contacting said population with a test agent;

determining an agent phenoprofile for said population, wherein the agent phenoprofile comprises a quantitative description of one or more traits exhibited by fly larvae in said population;

comparing the agent phenoprofile to a reference phenoprofile, wherein the reference phenoprofile comprises a quantitative description of said one or more traits exhibited by specimens in a reference population; and

selecting said agent based on the comparison of the agent phenoprofile and the reference phenoprofile corresponding to said agent; and

formulating said agent for administration to a mammal.

25. The method of claim 23 or 24 wherein said trait is selected from the group consisting of total distance traveled over a defined period of time, distance traveled in X direction over a defined period of time; distance traveled in Y direction over a defined period of time; total distance moved per time unit; distance moved in X direction per time unit; distance moved in Y direction per time unit); the rate of change of velocity per time unit, turning, stumbling, spatial position, and path shape.

26. The method of claim 23 or 24 wherein said step of determining comprises measuring data selected from the group consisting of X-pos, X-speed, speed, turning, stumbling, size, T-count, P-count, T-length, Cross150, Cross250, and F-count.

27. The method of claim 23 or 24 wherein said trait is selected from the group consisting of movement of one fly larva toward or away from another fly larva, occurrence of no relative spatial displacement of two fly larvae, occurrence of two fly larvae within a defined distance from each other, and occurrence of two fly larvae more than a defined distance away from each other.

28. The method of claim 23 or 24, wherein said trait is a morphological trait.

29. The method of claim 1, 2, 9, 10, 15, 20, or 24, wherein said fly larva is transgenic.

30. The method of claim 29, wherein said fly larva is transgenic for a gene encoding a polypeptide with an expanded polyglutamine tract as compared to the wild-type polypeptide.

31. The method of claim 30, wherein the expression of the transgene results neurodegeneration in said specimen.

32. The method of claim 1, 2, 9, 10, 15, 20, or 24 wherein said fly larva comprises a genetic mutation resulting in a loss of function or a gain of function.

33. The method of claim 9, 10, 15, 23, or 24, wherein said fly larva is a transgenic fly larva, and said reference population is selected from the group consisting of (i) transgenic fly larvae not contacted with a test agent; (ii) transgenic fly larvae contacted with an agent with a known activity on said fly larvae; (iii) nontransgenic fly larvae with the genetic background of the transgenic fly larvae; or (iv) transgenic fly larvae not expressing a disease gene and not contacted with a test agent.

34. The method of claim 9, 10, 15, 23, or 24, wherein said reference population is selected from the group consisting of (i) fly larvae comprising a genetic mutation not contacted with a test agent; (ii) fly larvae comprising a genetic mutation contacted with an agent with a known activity on said fly larvae; or (iii) fly larvae without the genetic mutation.